

1   **WHAT IS CLAIMED IS:**

2       1. A tunable filter with a wide free spectral range, comprising:

3       a first collimator;

4       a second collimator opposed to the first collimator; and

5       a mirror interposed between the first and second collimators, with an

6       appropriate tilt angle and a high reflectivity lens, whereby a resonance cavity is

7       defined in a space between the mirror and the second collimator.

8       2. The tunable filter as claimed in claim 1, wherein the tunable filter using a

9       heat actuator has a mirror coated with a multi-layer membrane on a concave lens

10      on opposite side of an aperture on a substrate; where the multi-layer membrane is

11      formed with alternate layers of GaAs and AlAs.

12      3. The tunable filter as claimed in claim 1, wherein the tunable filter using

13      an electrostatic actuator has a mirror coated with a multi-layer membrane on a

14      concave lens surface on opposite side of an aperture on a substrate; wherein the

15      mirror has a dielectric layer and an electrode layer formed on top of the mirror

16      forming air pockets on opposite side of the aperture on the substrate and the

17      concave lens surface of the mirror.

18      4. The tunable filter as claimed in claim 3, wherein the multi-layered

19      membrane is formed by alternate layers of GaAs and AlAs.

20      5. The tunable filter as claimed in claim 3, wherein the multi-layered

21      membrane is formed by alternate layers of  $\text{TiO}_2$  and  $\text{SiO}_2$ .

22      6. The tunable filter as claimed in claim 1, wherein the first collimator has

23      an anti-reflection coating on the lens surface.

24      7. The tunable filter as claimed in claim 1, wherein the second collimator

1 has a high reflectivity layer on the lens surface, whereby a resonance cavity is  
2 defined in the space between the concave lens of the mirror and the second  
3 collimator.

4 8. The tunable filter as claimed in claim 6, wherein the second collimator  
5 has a high reflectivity layer on lens surface, whereby a resonance cavity is  
6 defined in the space between the concave lens of the mirror and the second  
7 collimator.